

THE EFFECTS OF QUESTION-GENERATION TECHNIQUES  
ON READING COMPREHENSION

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A Field Report  
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by  
Laura L. Sivadge  
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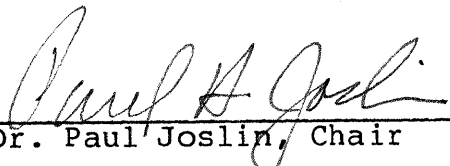
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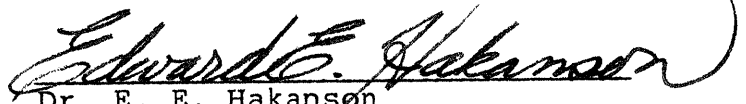
THE EFFECTS OF QUESTION-GENERATION TECHNIQUES  
ON READING COMPREHENSION


by

Laura L. Sivadge

Approved by Committee:

  
Dr. Paul Joslin, Chair

  
Dr. E. E. Hakanson

  
Dr. James Romig  
Dean of the Graduate School of Education

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An abstract of a Field Report by  
Laura L. Sivadge  
December 1990  
Drake University  
Advisor: Dr. Paul Joslin

The problem. Can the teaching of question-generation training improve reading comprehension and is there evidence of a successful student transference and application of question-generation training in content area subjects?

Procedure. The subjects in this study were thirty-one sixth through eighth grade students at Norwalk Middle School who received instruction in the Developmental Reading Lab. Sixteen of the thirty-one students were given thirty-four lessons using question-generation comprehension techniques during one semester. Data were collected for grade point average and reading comprehension scores on the Iowa Test of Basic Skills (ITBS). At the beginning and conclusion of the semester, all students were given the reading comprehension subtest of the Stanford Diagnostic Reading Test (SDRT).

Findings. A correlation of 0.580 was found between the two reading subtests. The administration of t-tests found the reading comprehension abilities of the students in the treatment and control groups similar at the onset and conclusion of this study. The correlation between the students' grade point averages and performance on the SDRT was 0.307.

Conclusions. The results of this study indicate that the treatment made no difference in comprehension skill improvement. The inclusion of the question-generation technique in a program does not impede progress. However, it is evident that other factors, in addition to question-generation techniques, are involved in the prediction of reading comprehension ability.

Recommendations. Further studies are needed to ascertain whether efforts which increase question-generation usage could increase the level of an individual's reading comprehension.

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## CHAPTER 1

### Identification of the Problem

Of past and present concern in the field of reading is student ability to comprehend material read. Reading comprehension is evaluated by using questions. To successfully respond to a question, the student is often required to integrate several skills and processes such as prior knowledge and memory search strategies using text cues.

As educators, we need to assess our questioning proficiency as we attempt to improve students' comprehension skills. Over a period of several decades, many researchers have reported that most questions teachers pose are at the literal or recall level (Daines, 1982; Gall, 1970, 1984).

One may assume that the results of educational research and literature regarding the importance of high-level questioning techniques would be evident in today's classroom teaching practices. However, a major educational concern is that instruction is focused on a lower order of thinking, and students are not being taught or encouraged to use higher thinking skills.

In a study by Daines, data regarding the level of questions teachers pose were collected. Daines found that

93 percent of 5,289 teacher questions were at the literal level of comprehension. In contrast, slightly less than 7 percent were interpretative questions. Less than 1 percent affective-type questions were asked, and application questions were not posed.

From the results of this study, one could conclude that constant teacher modeling of asking questions at the literal level relays the message to students that teachers expect them to perform predominantly at the factual and recall level of thinking.

This study by Daines was concerned with the effects of question-generation training on comprehension question performance. Daines stressed that the student becomes an active participant in his or her learning when question-generation techniques are applied. Generating good higher-order questions may affect student accuracy on post-passage comprehension questions.

In using question-generation strategies, the student reads a passage and develops questions of his or her own which are related to the text covered. The student not only develops the questions, but also creates the answer.

For students to be active comprehenders and independent thinkers, they must generate questions that shape, focus, and guide their thinking in reading. This approach requires the student to search out the main idea of the passage and to rewrite, in question form, the main topic of concern.

The student is required to develop questions of varied levels which include literal, interpretative and evaluative questions.

The research problem of this study was one of determining if question-generation training had an effect on students' comprehension abilities. Comprehension skills at the literal and inferential levels were evaluated.

#### Statement of the Problem

The following two problems were studied:

1. Does the teaching of question-generation training improve reading comprehension?
2. Is there evidence of a successful transference and application of the question-generation training to content area subjects?

#### Research Hypotheses

Hypotheses included the following:

1. There is no relationship between performance on the Iowa Test of Basic Skills (ITBS) Reading Comprehension subtest and performance on the Reading Comprehension subtest of the Standard Diagnostic Reading Test (SDRT).
2. Reading comprehension ability, as measured by the SDRT, will remain unaffected by instruction in question-generation techniques.

3. There is no relationship between a grade point average (GPA) and performance on the reading comprehension subtest of the SDRT.

#### Limitations

This study used a population of thirty-one students enrolled in the Developmental Reading Lab during the second semester from January 26 through May 20, 1988. Some of the thirty-one students received individualized reading instruction and the others attended the Developmental Reading Lab for small group instruction. Although intact groups were used for the instruction of question-generation training, classes which received the treatment were chosen at random. Treatment and control sections contained four to six students each. The same instructor taught both the treatment and control groups. This minimized threats to internal reliability.

Testing occurred only once after the treatment group had received the instruction in question-generation skills. During the week of January 26, 1988, all of the students were given the SDRT, Form A, as their pretest. The ITBS was administered in October 1987. Form B of the SDRT was given during the week of May 16, 1988.

#### Delimitations

Sixteen out of the thirty-one students enrolled in the Developmental Reading Lab were chosen at random to receive

instruction in question-generation training. These classes were composed of students ranging from age eleven to thirteen. To attend the reading lab, students must exhibit below-grade-level reading competencies as measured by the SDRT. However, these students are not learning handicapped. The results of this study apply only to similar student populations.

#### Definition of Terms

The independent variables were receiving or not receiving question-generation training, semester grade point average and ITBS score.

The dependent variable was the level of reading comprehension as measured by a standardized test score.

Question-generation technique was the students' process of generating good higher-order questions which may affect the accuracy of responses to post-passage questions.

The levels of comprehension were the subtest score of the SDRT and the reading score of the ITBS. The comprehension scores from these two tests were never combined; however, they were compared.

Reading lab students consisted of all students enrolled in the Developmental Reading Lab at Norwalk Middle School in grades six through eight.



## CHAPTER 2

### Review of the Literature

This literature review describes studies in the following areas:

1. The quality of questions asked in the classroom which would stimulate development of cognitive abilities beyond memorization.
2. Effects of teaching question-generation reading comprehension skills on subsequent reading comprehension tasks.

The development of strong comprehension skills is an integral component of each student's reading program. As a student progresses from elementary school to junior high or middle school, the importance of both literal and inferential comprehension reading skills is of even greater importance. In addition to comprehending material read in reading class, the middle school student must also comprehend content area texts. This can be overwhelming for the student if proper training in comprehension techniques is absent from the curriculum.

The goal of instruction should be to improve students' ability to comprehend. That is, we should be more concerned about the extent to which students will comprehend other

reading selections without teacher assistance. We must teach students a strategy that will improve their comprehension when the teacher is not available to assist them (Perez, 1986).

Singer and Donlan (1982) believe that the goal of instruction is to have readers acquire not only knowledge, but also a process for learning how to learn. Students can learn from text by formulating and reading to answer self-posed questions.

Generation of appropriate questions for selecting from the text and storing relevant and knowledge-enhancing information depends upon pre-existing knowledge structures (Miyake & Norman, 1979). A reader has to know enough to ask appropriate questions.

A major concern reiterated throughout research on thinking and questioning is that instruction is all too often focused on the lower order of thinking. Students are not being taught, or even encouraged, to use higher thinking skills. The high-order skills will be developed only after the teacher and student are capable of asking quality questions which go beyond the recall level (Daines, 1986).

In 1966, Sanders proposed a hierarchical question classification system, which is displayed in Figure 1. Sanders used seven levels of Bloom's Taxonomy for his categories. These were memory, translation, interpretation, application, analysis, synthesis, and evaluation.

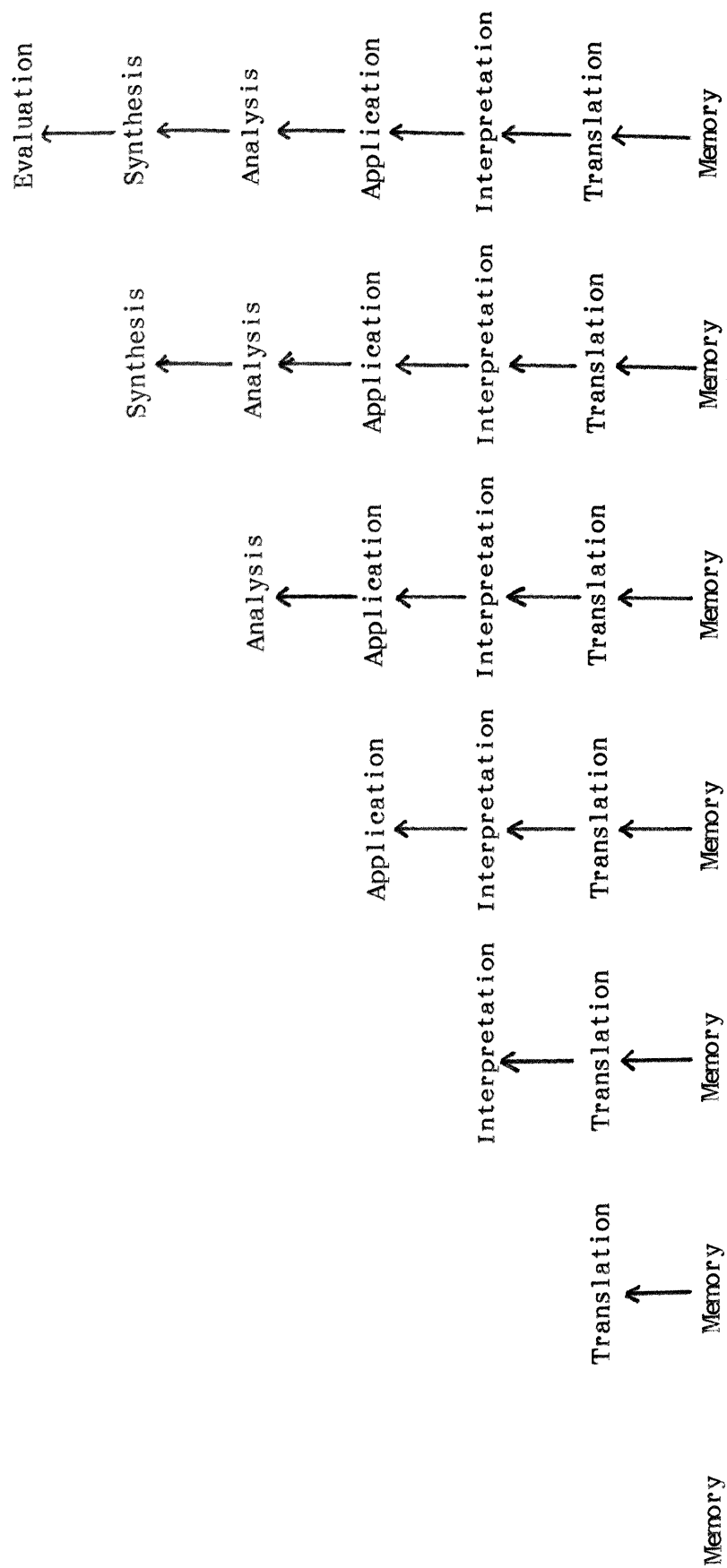


Figure 1

Sander's Question Classification System

The first level, memory, included literal questions that are limited to the recall of exact facts in a text. This type of questioning requires a low order of thinking.

At the second level of questioning, which is translation, the student is asked to restate ideas. The third level is interpretation. The students' answers must be based on inferences made and comparisons or contrasts formulated.

Application is the fourth level of questioning. Current research in education is placing an emphasis on the need to include problem solving in the curriculum (Daines, 1986). Questions in this category require students to apply prior knowledge to solve problems in new situations.

At the analysis level, the student must make judgments based on the criteria or standards given. The sixth level, synthesis, requires the development of a conclusion which is reached by logical deduction.

The final level of Sander's question classification system is evaluation. This level of questioning allows the student to examine his or her own attitudes, appreciations and opinions. This is principled thinking.

As long ago as 1966, Sanders stated that far too many teachers overemphasize those questions which require students only to remember, and practically no teachers make full use of all worthwhile kinds of questions (Frager, 1986). A 1967 study by Guszak found that 70 percent of

the questions asked by teachers in reading groups were at the recall or recognition level. In 1972, Ruddell was in agreement with Guszak when he also found that about 70 percent of teacher questions during a reading lesson were at the factual level.

Daines (1986) reinforced the results of the preceding studies when she wrote that several researchers have found that most questions teachers pose are at the literal or recall level (Daines, 1982; Gall, 1970, 1984). Notice by researchers Sanders, Guszak and Ruddell of this need to improve questioning techniques had gone unheeded. Daines' study indicated that 93 percent of the teacher questions she researched were at the literal level of comprehension.

The constant model of asking literal questions and repeating students' answers to low-order questions seems to connote to students that teachers expect them to perform at the factual and recall level of thinking. The research also indicates that education is greatly improved when the teacher uses high-order questions which results in excellent modeling for the students to follow (Frager, 1986).

One approach that has the potential of enhancing comprehension question performance is instruction in question-generation. Generating good higher-order questions may affect the accuracy of question responses in several ways.

1. Studies have suggested that effective question-generation may involve readers in active comprehension (Singer, 1978).
2. Students trained in effective self-questioning may have heightened self-awareness of their comprehension adequacy (a metacognitive feature).
3. Training in question-generation may be particularly effective for familiarizing students with the cognitive and linguistic demands of question answering (Davey & McBride, 1986).

Question-generation requires the student to identify the main idea of the text read. This leads to the next step which is the formation of an acceptable question stem, and the relation between questions and acceptable responses.

Presently, there is little research information regarding student-generated questions and comprehension abilities. The bulk of research on question-generation has been conducted with high school students or adults (Andre & Anderson, 1978-1979; Frase & Schwartz, 1975; Singer & Donlan, 1982).

The findings in these studies do show slight improvement in responses to comprehension questions when using the question-generation technique. Lower-ability students appear to profit more from this questioning process than the average-ability student. The findings of Davey and McBride (1986) recommend further systematic investigations

of interactions between various reader characteristics and interventions in question-generation.

A student using the question-generation process should highlight, underline, or record main ideas as prose is being read. These main ideas will then be used to generate questions based upon them. The questions asked are to be at all levels of thinking and questioning. Higher-order questions are presumed to create a more thorough processing of the materials read.

Limited research information was available regarding the Stanford Diagnostic Reading Test. The Psychological Corporation, which developed the SDRT, included in the administrator's manual technical information regarding the research and development of this reading test. The only study which could be found citing the correlation of the SDRT to another standardized test was in the area of criterion validity. The Stanford Achievement Test was the test used for this correlation. A correlation of the ITBS with the SDRT will indicate whether the two tests are measuring reading comprehension in the same terms.

The research cited in this review, and numerous educational studies, have provided the educational community with the information that we do need to improve the questioning techniques used in the classroom. It is apparent that we need to implement the practice of asking higher-level questions throughout the curriculum. This in

turn would require the students to become more active participants in their learning, not only in reading class, but in all other disciplines of study.



## CHAPTER 3

## Method

This study considered factors that might predict the level of comprehension in middle school students. These factors included grade point average, test scores from the ITBS, and teacher-directed lessons in question-generation training.

Research Design

A pretest-posttest control group design was used. Class sections were randomly selected which helped control threats to internal validity such as selection and maturation. This experimental design can be diagrammed as follows:

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R	01	X	02
R	03		04

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This study used some information already available from school records and test results from the ITBS. The SDRT, Form A, was given to all students as a pretest. Treatment groups received special instruction in question-generation training. The treatment was given over a period of one

semester and incorporated in the Developmental Reading Lab class sessions.

The students in the control groups had lessons identical to the treatment groups, but received no special instruction in the process of question-generation. The reading comprehension of all groups was tested at the end of one semester with the administration of the SDRT, Form B, reading test.

### Subjects

The number of students enrolled in the Developmental Reading Lab of Norwalk Middle School can vary. During this particular study there were thirty-one students attending the reading lab for daily or supplemental reading instruction.

In order to attend the reading lab, a student must meet certain criteria. In the fall, all incoming sixth graders, all students new to the school, and teacher-referred students with suspected reading difficulties are given the SDRT, Form A. The results of this standardized test, teacher recommendation, and previous reading grades and standardized test results are reviewed in the screening process. This procedure determines the class members of the reading lab.

This is not a federally-funded program, so a student need only meet the criteria established by the Norwalk School District in order to receive the additional reading

services. Some students attend for a daily reading lesson with the lab teacher as their sole reading instructor. Other students attend for two or three sessions during the week, and the instructor reviews and reinforces various reading skills. The students are all of fairly equal reading ability, with a reading level of one or two years below grade level. None in the reading lab are special education students.

The study included thirteen females and eighteen males. Age was fairly evenly distributed with fourteen sixth graders, nine seventh graders, and eight eighth-grade students in attendance.

#### Sampling Design

Only one teacher was involved in this study. There was little threat of varied teaching styles or test administration procedures to cause a discrepancy in test results.

Of the eleven sections of reading lab classes, six randomly-chosen treatment sections were given teacher-directed lessons in question-generation skills. Treatment and control sections contained four to six students each. Assignment to treatment or control group was done on a random basis.

Data were collected from school records for GPA and scores on the ITBS.

### Instrumentation

The two tests given during this period of research were the SDRT, Forms A and B. All students were given the SDRT, Form A, Brown Level, as the pretest. The SDRT, Form B, Brown Level, was used as the posttest. The SDRT Brown Level is developed for use in grades five through eight, and is also suggested for use with low-achieving high school students. It measures phonetic and structural analysis, auditory vocabulary, literal and inferential comprehension, and reading rate. For the purposes of this particular research, only the subtests covering comprehension were given.

The comprehension subtest on the SDRT, Brown Level, is a thirty-five minute, multiple-choice test of sixty items. Thirty of these items test literal comprehension abilities, and the other thirty items test inferential comprehension abilities.

At the Brown Level, comprehension is assessed by means of short passages followed by questions. The subject matter represents a variety of areas. The readability level of these passages was formulated using the Dale-Chall Readability Formula. The grade level estimates for these passages are five to eight.

Due to the design of this study, a strong correlation between the two test forms used was imperative. The alternate form reliability for the reading comprehension

subtest was .89 or a 79 percent accuracy for the seventh-grade students involved in the standardization sample. The eighth-grade students involved in the sample had a .85 reliability with 72 percent accuracy.

The Thurstone Absolute Scaling Procedure was used to develop the SDRT system of scaled scores. This procedure is "absolute" in the sense that the scale is independent of the number of raw score units and the shape of the raw score distribution (Karlsen, Madden & Gardner, 1976).

The Kuder-Richardson Formula #20 was used to determine the internal consistency reliability of the SDRT scores. Appendix A presents Kuder-Richardson Formula #20 reliability coefficients and standard errors of measurement in raw scores for grades six through eight involved in the standardization sample of the SDRT.

High content validity of this test was established by pupils involved in the standardization sample. The proportion of the sampling group tested who answered each item correctly is included in the SDRT Manual for Interpreting. The SDRT can be said to be valid for measuring objectives written to reflect the content of reading programs used commonly throughout the country.

The criterion validity of the SDRT was obtained by giving all subjects Form A of the SDRT and also the Reading Tests of the Stanford Achievement Test. The criterion validity assessed from these two tests for the sixth-grade

pupils involved in the standardization sample had a range of .56 to .98 correlation. The average correlation was .82.

### Treatment Procedures

The treatment groups received a total of thirty lessons involving question-generation techniques over a seventeen-week period. The lessons were approximate in length, and were incorporated into the regular class schedule. The fifteen- to twenty-minute lessons were given twice a week.

The same instructor taught both the control and the treated members of this research. The instruction of the treatment group entailed the following process:

1. Short passages, approximately 200-300 words in length, were read by the students.
2. The students were asked to underline/record the main idea of the passage read.
3. The students were also asked to make note of details to support the main idea in the passage.
4. The students were then directed to generate questions based on the main idea and its supporting details.
5. The students were also required to create at least one inferential question over the passage read.
6. Additional opportunities to apply the question-generation skills in the content-area subjects were offered at various times throughout this time period.

The instruction for the control groups is described below:

1. Short passages identical to those of the treatment groups were read by the students.
2. There was a class discussion about the passage read.
3. The students individually completed the comprehension questions which accompanied each reading passage.

At the end of the seventeen-week period, all students in the treatment and control classes were given the SDRT, Form B. The test was administered according to the manual instructions, and was hand-scored by the researcher.

#### Data Collection

All test data were treated as interval and included the comprehension scores on the SDRT, Brown Level, Forms A and B. The comprehension tests were given at two separate dates. Form A was the pretest and Form B the posttest. This was a repeated-measures study: it tested the performance of the same group of pupils at specified intervals before and after instruction. The raw scores earned on the SDRT were converted into grade equivalencies to coordinate with the statistical measurements of the ITBS. The ITBS scores were available from tests that school guidance services had administered in the fall semester. Information about age and grade point average was available

from school records.

### Data Analysis

Descriptive statistics that included central tendency, frequency distribution, and variability were computed for the reading comprehension test results. t-Tests were used to measure the difference between the two means computed for the experimental and control groups. The level of comprehension deficiency was classified from the pretest scores. Pretest and posttest grade equivalency scores were used to compute gain scores.

Hypothesis 1. The relationship between the Iowa Test of Basic Skills and the Stanford Diagnostic Reading Test reading comprehension scores was tested using a Pearson-Product Moment correlation.

Hypothesis 2. A t-test was run on the pretest and posttest scores of both the treatment and control groups to note if significant gains had been made by either or both groups. An additional t-test was run to note if there was a significant difference in the gains made by either the treatment or the control group.

Hypotheses 3. The relationship between the GPA of each student and his or her reading comprehension score on the SDRT was tested using a Pearson-Product Moment correlation.



## CHAPTER 4

### Results

The three hypotheses and results for each are reported here.

1. There is no relationship between performance on the Iowa Test of Basic Skills (ITBS) Reading Comprehension subtest, and performance on the Reading Comprehension subtest of the Stanford Diagnostic Reading Test (SDRT).

A Pearson Correlation Coefficient was used to compare score results on the two reading comprehension subtests. A positive correlation of 0.580 was found.

The mean score on the ITBS Reading Comprehension subtest (treatment and control) was a 5.839 grade equivalency with a standard deviation of 1.175 (N=31).

This hypothesis would be accepted because there is a weak relationship between performance on the ITBS Reading Comprehension subtest and the performance on the Reading Comprehension subtest of the SDRT. It is possible that only 34 percent of the time such a relationship would exist.

The mean score on the SDRT Reading Comprehension subtest (treatment and control) was a 6.645 grade equivalency with a standard deviation of 1.172 (N=31).

2. Reading comprehension ability, as measured by the SDRT, will remain unaffected by instruction in question-generation techniques.

To determine the mean reading comprehension ability of both the treatment and control groups, descriptive statistics were run. A t-test was then administered to compare the means of the treatment and control groups on the pretest of the SDRT. A t-value of 0.056 resulted and was found not to be significant. This confirmed that both groups had comparable reading comprehension abilities before the treatment was introduced.

Descriptive statistics were also run at the conclusion of this study. A t-test was administered to measure and compare comprehension abilities of the treatment and control groups. A t-value of 0.121 was the result of this statistical comparison, and found not to be significant.

This hypothesis is accepted as the results of this comparison substantiated the null hypothesis which stated that reading comprehension ability would remain unaffected by the treatment.

3. There is no relationship between a student's grade point average (GPA) and performance on the reading comprehension subtest of the Stanford Diagnostic Reading Test (SDRT).

A correlation of the students' grade point averages to the SDRT comprehension scores was made using a Pearson Correlation Coefficient. A positive correlation of 0.307 was found.

A t-test was run to compare GPA in content area classes (history, social studies and science) between the treatment and control groups. A t-value of 0.013 was not found to be

significant.

This hypothesis is accepted as the correlation was found to be insignificant. This study found that using a student's GPA as a predictor for reading comprehension ability would be accurate 9 percent of the time.

Table 1

Pearson Product Correlations Between X and Y Variables

X Variable	Y Variable	Correlation	R-Squared
ITBS	SDRT	.580	.336
GPA	SDRT	.307	.094

Table 2

t-Test Comparison Between Treatment and Control Groups  
Using Grade Equivalencies

	Pretest	Posttest	Gain
Treatment	6.719	7.788	1.069
Control	6.707	7.793	1.086

## CHAPTER 5

### Discussion

The purposes of this study were (1) to find variables that might predict reading comprehension ability and (2) to find whether the teaching of question-generation skills enhance students' performance on tests of reading comprehension and work in content area courses.

The weak positive correlation of 0.580 between the ITBS and SDRT may be artificially low because of the different testing climates of these two tests. The ITBS is a battery of tests given over a four-day period. Because of the extensive testing, this tends to result in lack of commitment by the students and lower test scores.

The SDRT comprehension subtest is administered in thirty-five minutes and concentrates on one specific skill. Knowing exactly what skills the material is testing and the concentrated time commitment maintains the attention of most students. Students in the Developmental Reading Lab find this testing situation much more conducive to accurately displaying reading capabilities.

It would prove interesting to conduct this same correlation study using a population of students working at

above-grade level. It is reasonable to infer that a stronger correlation would result.

This correlation suggests the need for those in education to give at least one additional standardized test to a student before classifying a student as low, high or at grade level regarding abilities. The broad picture of a student's abilities should be reviewed before making judgments.

The descriptive statistics of the SDRT pretest show the treatment and control groups to have identical reading abilities. The individuals in the two groups were equally capable of making gains in the area of reading comprehension.

Analysis of the reading comprehension gains made by the two groups show that the treatment group had a 1.07 grade equivalency growth, and the control group had a 1.09 increase.

The results of this comparison show that the inclusion of the question-generation technique practices in the curriculum of the treated group had no measurable effect on the students' achievements in either a positive or negative manner.

The students in both groups had a one-year reading growth gain in comprehension during the four-month research period. This measurable gain does support one of the goals of the Developmental Reading Lab. The lab was established

to serve the interests of those students who do not qualify for assistance under special education guidelines. Their interests are best served in small-group instruction.

There was a very weak positive correlation of 0.307 found between the students' grade point averages, and the SDRT reading score. This may be a reflection of the time-on-task commitment of the students attending the reading lab. The short-term goal of completing the SDRT at the best of their abilities within a thirty-five minute time period is much easier to achieve than to maintain a concentrated effort in daily assignments for a semester of classwork.

The results of this correlation indicate that the students have the ability to perform better in their daily work than their grade point averages designate. If there is more reinforcement of the content area subjects incorporated into the lab's curriculum, the GPA's may increase.

As in previous studies concerning the effects of question-generation techniques and comprehension improvement, the results of this study indicate that the treatment made no difference in comprehension skill improvement. Further studies are needed to ascertain whether efforts which increase question-generation usage could increase the level of reading comprehension.

From this study, it is evident that other factors are involved in the prediction of reading comprehension ability. The inclusion of the technique of

question-generation in a program does not impede a student's progress. The present interest in higher-order thinking and questioning skills may prompt continued studies about predicting and improving the growth of reading comprehension abilities in students.

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## APPENDICES

## APPENDIX A

## SDRT RELIABILITY AND STANDARD ERRORS OF MEASUREMENT

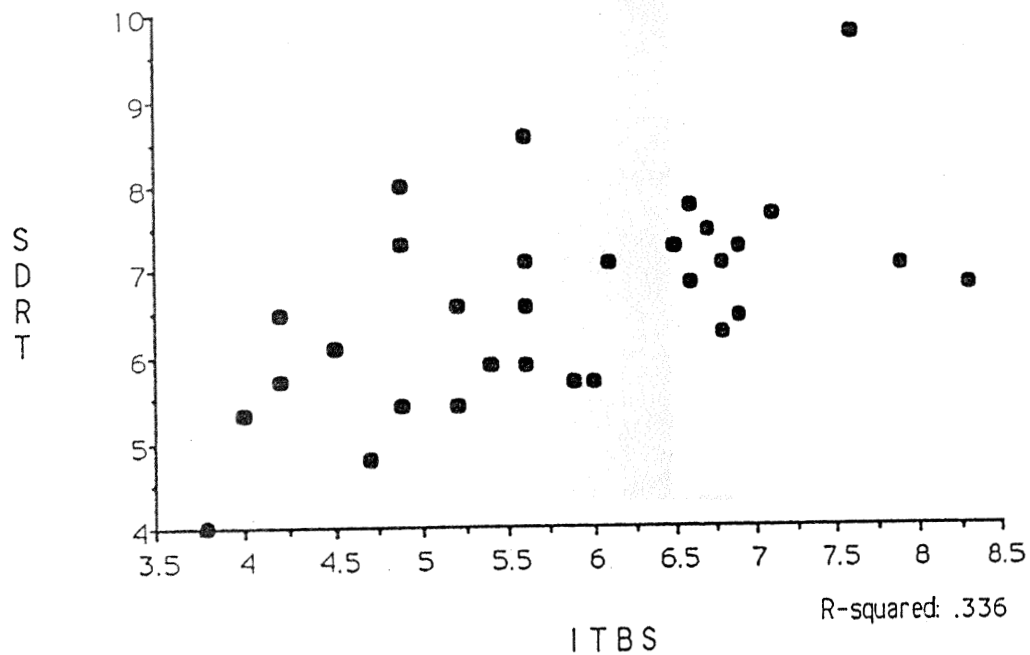
SDRT Literal and Inferential Comprehension  
 Kuder-Richardson Formula #20 Reliability  
 Coefficients, and Standard Errors of  
 Measurement

Stanford Diagnostic Reading Test	Form A		Form B	
	Raw Scores rtt	SEm	Raw Scores rtt	SEm
<u>Grade 6</u>				
Reading Comprehension	.96	3.1	.94	3.2
Literal	.93	2.1	.90	2.1
Inferential	.92	2.1	.89	2.3
<u>Grade 7</u>				
Reading Comprehension	.97	2.8	.95	2.8
Literal	.94	2.0	.91	1.9
Inferential	.93	2.1	.89	2.2
<u>Grade 8</u>				
Reading Comprehension	.97	2.6	.94	2.8
Literal	.95	1.7	.90	1.8
Inferential	.94	1.9	.89	2.0

## APPENDIX B

CORRELATION: ITBS AND SDRT

SCATTERGRAM of ITBS vs. SDRT



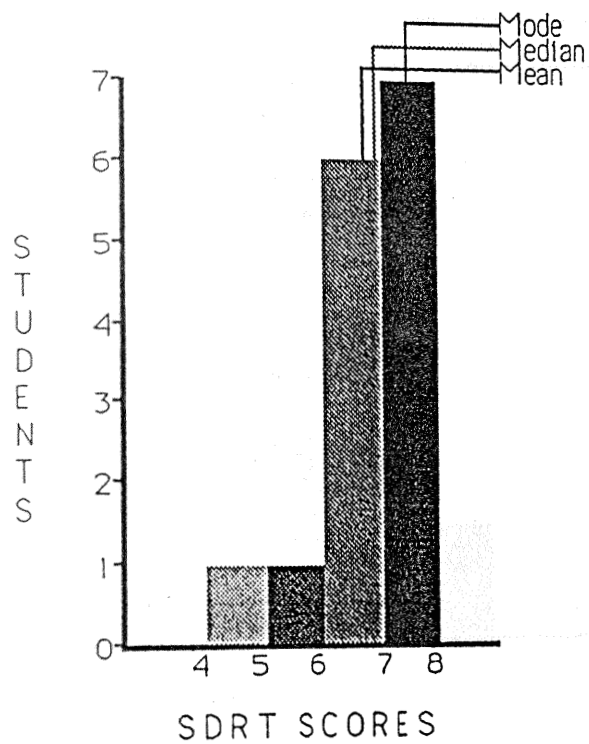
Corr. Coeff. X:ITBS Y:SDRT

Count:	Covariance:	Correlation:	R-squared:
31	.799	.58	.336

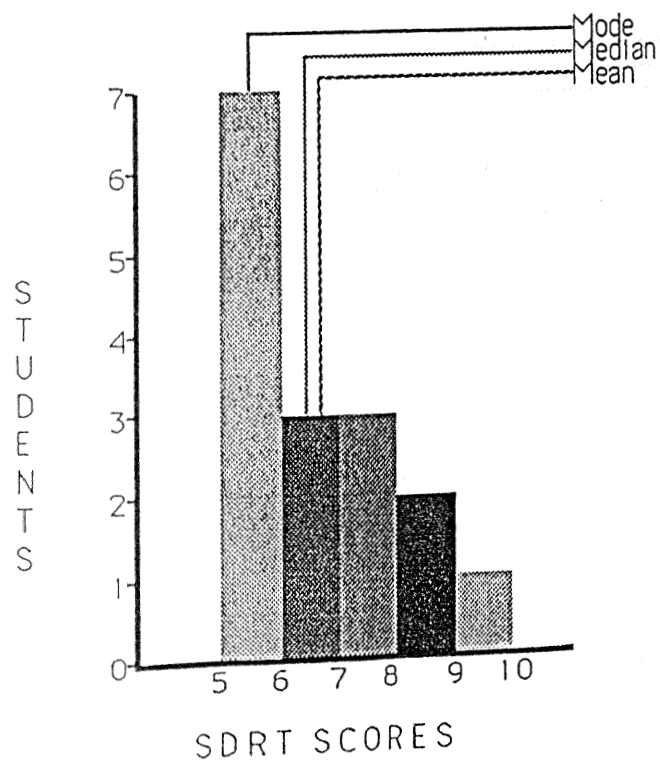
## APPENDIX C

## HISTOGRAMS OF SDRT PRETESTS

HISTOGRAM of SDRT PRETEST CONTROL GROUP



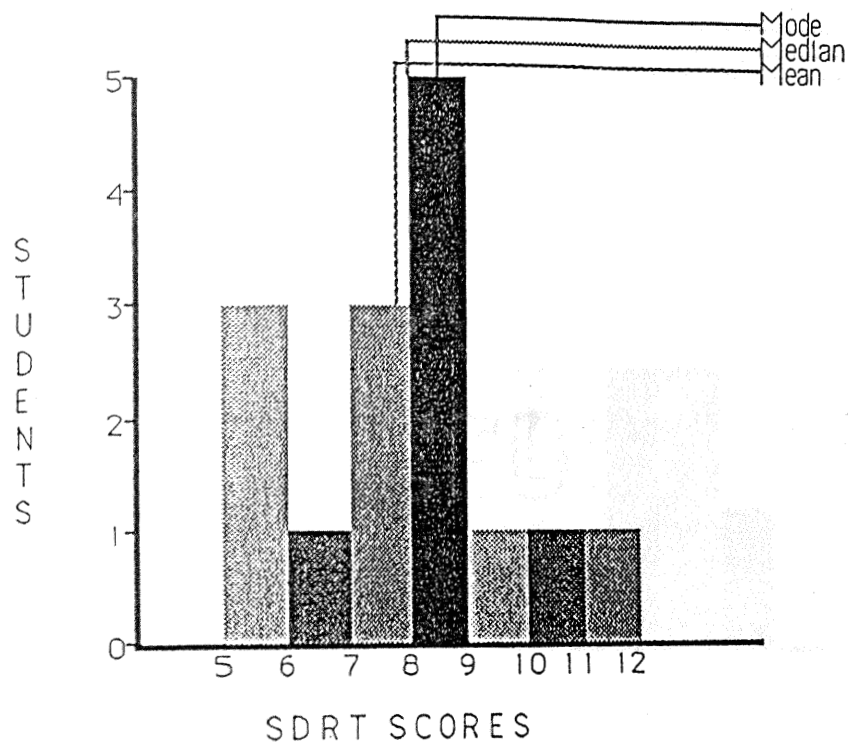
HISTOGRAM of SDRT PRETEST TREATMENT GROUP



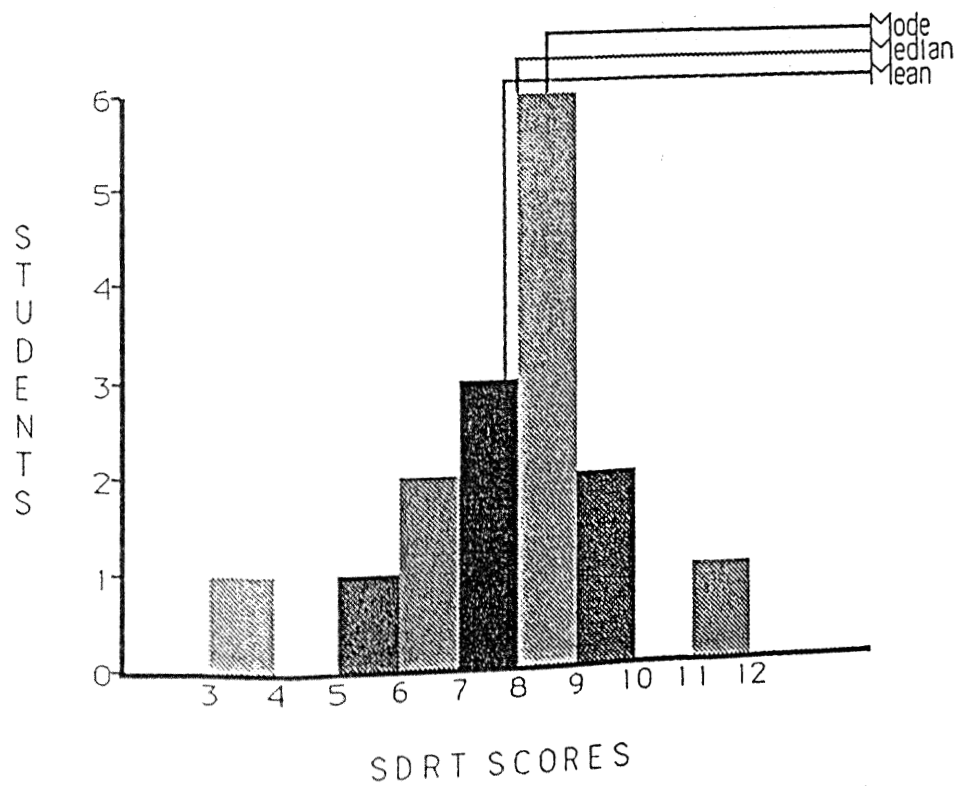
## APPENDIX D

## HISTOGRAMS OF SDRT POSTTESTS

HISTOGRAM of SDRT POSTTEST CONTROL GROUP



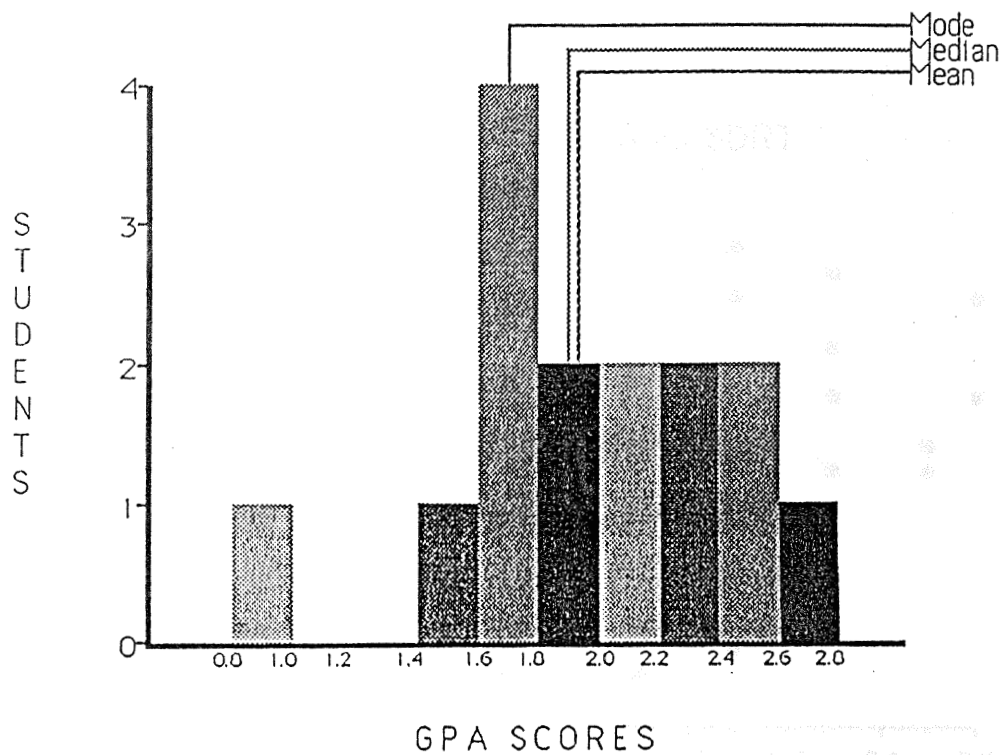
HISTOGRAM of SDRT POSTTEST TREATMENT GROUP



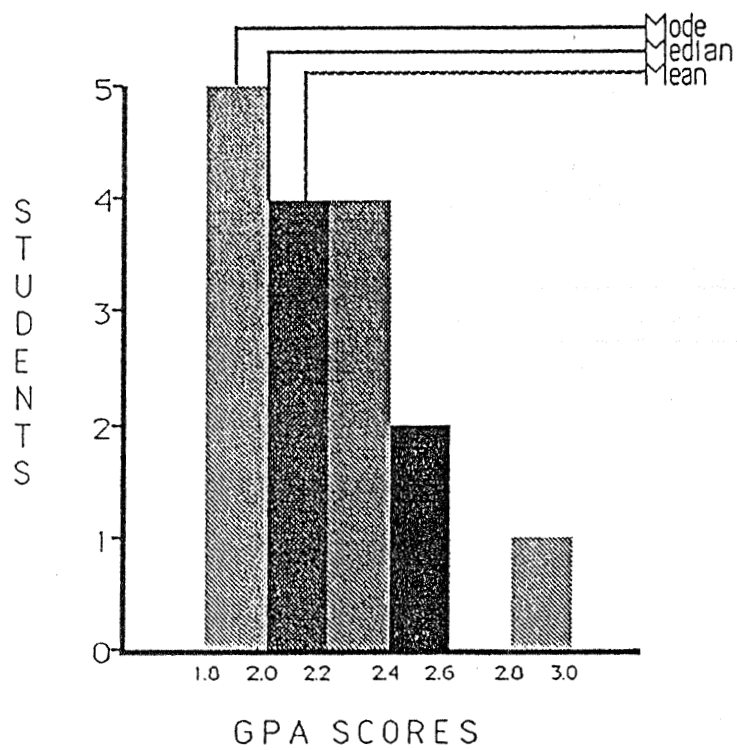
## APPENDIX E

## HISTOGRAMS OF GPA

HISTOGRAM of GPA CONTROL GROUP



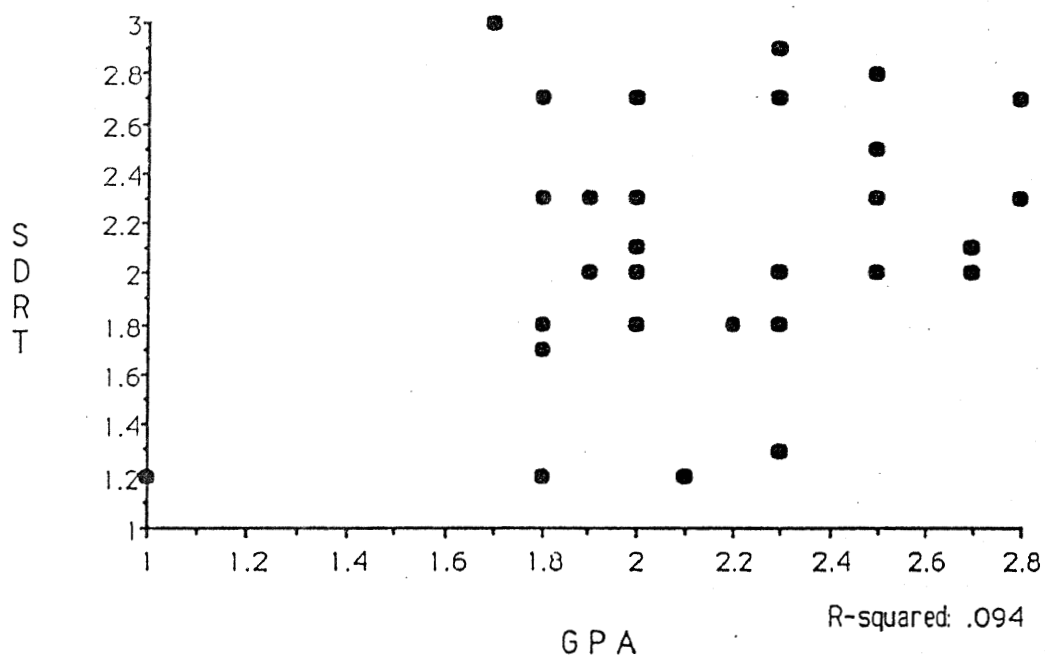
HISTOGRAM of GPA TREATMENT GROUP



## APPENDIX F

CORRELATION: GPA AND SDRT

SCATTERGRAM of GPA vs. SDRT



Corr. Coeff. X:GPA Y:SDRT

Count:	Covariance:	Correlation:	R-squared:
31	.061	.307	.094